



RESEARCH ARTICLE

# Students' Perceptions of Team-based Learning in an Undergraduate Nutrition School

[version 2]

Patricia Constante Jaime, Cláudia Raulino Tramontt, Kamila Tiemann Gabe, Lígia Cardoso dos Reis, Tarsis de Mattos Maia

School of Public Health /University of São Paulo

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## Abstract

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**Introduction:** Current challenges in the food and nutrition fields have required training nutritionists to develop teamwork skills, demanding the use of active methodologies.

**Methods:** This qualitative descriptive study aimed at knowing Nutrition students' perceptions about the use of Team Based Learning (TBL) in a course. Focus groups were conducted and submitted to content analysis.

**Results:** Categories were grouped into three axes: (1) principles of the method (teamwork, individual preparation and teacher's role), (2) results of the experience (knowledge acquisition, critical judgment and communication/argumentation) and (3) meanings of the experience (engagement/motivation and preference for the method). Teamwork was the most frequent category (51 occurrences), followed by knowledge acquisition (44) and engagement/motivation (35). Axis 1 categories came out linked to each other and to at least one Axis 2 category, revealing the course's coherence with TBL principles, thus allowing better knowledge acquisition, communication skills, and development of critical judgment. Axis 3 was connected to the others, pointing out that both principles of the method and results of the experience contributed to students' engagement and preference for the method.

**Conclusion:** According to students' perceptions, TBL can contribute to provide nutritionists with better technical training, critical judgment, and communication skills.

## Open Peer Review

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1. **Ken Masters**, Sultan Qaboos University

2. **Barbara Jennings**, Norwich Medical School

3. **Ramon Esperon-Hernandez**, University of Yucatan

4. **Tharin Phenwan**, University of Dundee

5. **sathyaranarayanan varadarajan**, SRM Medical College, SRM University

6. **Augusto Scalabrini Neto**, University of Sao Paulo School of Medicine

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**Keywords**

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**Corresponding author:** Tarsis de Mattos Maia ([tarsismm@gmail.com](mailto:tarsismm@gmail.com))

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## Introduction

The field of Food and Nutrition has gained prominence in the global agenda and under the Sustainable Development Goals as a result of the commitment signed by several countries, within the United Nations Decade of Action on Nutrition (2016-2025), to eradicate hunger and all forms of malnutrition (FAO/WHO, 2016). Facing these challenges demands a highly qualified Nutrition workforce with technical-scientific knowledge as well as enhanced communication, management, teamwork and problem-solving skills (Fanzo *et al.*, 2015). Gaps in nutritionists' training have been pointed out (Recine and Mortoza, 2013) and indicate the need to review pedagogical projects to ensure humanistic, generalist and critical performance as well as decision-making, communication and leadership skills (Alves and Martinez, 2016).

A major challenge posed to undergraduate Nutrition Schools is the use of teaching-learning active methodologies that focus on problematization (Recine and Mortoza, 2013). They must lead to the development of key skills for future professional activity such as teamwork as well as political and management leadership (Frenk *et al.*, 2010). In response to this context, the use of Team Based Learning (TBL) to train health professionals has increased in recent decades in order to encourage critical thinking and change the education system in the (Reimschisel *et al.*, 2017). Nevertheless, studies evaluating the use of this methodology in undergraduate Nutrition Schools have not been found so far.

TBL is an educational strategy in which students are organized in multiple and small groups (5-7 individuals) to discuss contextualized problems in scenarios prepared by teachers. These discussions are designed to occur with and among teams, encouraging reasoning and debate (Haidet *et al.* 2012). Application of TBL requires a sequence of events aimed at maximizing learners' preparation and participation, namely: **Step 1** - Preclass preparation (individual study); **Step 2** - Ensuring student's readiness (Readiness Assessment Test, RAT) applied individually (iRAT) and in groups (gRAT), followed by written team appeals and teacher feedback; **Step 3** - Application of concepts through group problem-solving activities (Haidet *et al.*, 2012).

TBL's theoretical framework is grounded on constructivism, since the teacher becomes a facilitator of learning in an environment free of authoritarianism, takes into account students' previous experiences and knowledge, uses dialogue and interaction as a means for acquiring knowledge, and encourages students' thinking and reasoning in and about practice (Hryncak and Batty, 2012). Considering the lack of publications in this context, the present study analyzed perceptions of Undergraduate Nutrition students on the use of TBL in the course *Public Policies on Food and Nutrition* (PPF&N).

## Methods

This is a qualitative descriptive study to discuss the first application of TBL in *Public Policies on Food and Nutrition* (PPF&N) in two classes of the 4<sup>th</sup> year of an undergraduate Nutrition School, PPF&N is mandatory and it is part of the Nutrition School program. It aims at knowing and analyzing Food and Nutrition Public Policies in face of Brazil's epidemiological, social and political scenarios.

### TBL in the PPF&N Course

Fifteen 4-hour meetings (60 hours) were held. In the first meeting, the teacher presented TBL steps, the teaching plan, the schedule of activities, and the random division of teams (5-6 members). The other meetings were conducted as follows: one for a lecture and 13 for TBL sessions.

For Step 1, one week before each meeting, preparatory material was provided online (theoretical synthesis of the content; a situation based on simulated scenario developed by the teacher; and complementary bibliography). In Step 2, conducted in classroom, students took the Readiness Assessment Test (RAT), individually at first (iRAT) and then in teams (gRAT). It included 7-8 multiple choice questions based on the material provided, which could not be consulted during the test. At the end of each session, the teacher provided feedback through a lecture. Teams could appeal missed questions to the teacher within 72 hours (UBC, 2017). Step 3 was based on a problem situation in which teams should draw up a Food and Nutrition intervention plan. Students were evaluated according to their performances in this step and in the tests (iRAT and gRAT), in addition to peer evaluation within teams.

### Data Collection and Analysis

In order to understand students' perception of the experience, focal groups (FG) were used for data collection. All the research data collection was conducted after the course was completed and all assessments were done. This strategy guaranteed that the participation on FGs would not interfere on student's performance and did not feel coerced to join the FG either. Each class was divided into two FG groups, simultaneously conducted. Each one had the presence of a mediator and an observer with experience in this method. The observers were responsible for taking notes of the reactions, verbal and non verbal language and general observations. The script structure included: (1) expectations toward the TBL

method on the first day of class; (2) skills and competences developed at each TBL step; (3) the teacher's role in TBL; (4) the teaching-learning process; (5) challenges experienced during the course with the new method. FG meetings were recorded in audio and fully transcribed.

The data collected and transcribed were submitted to content analysis (Ryan e Bernard, 2010) and was analyzed by two pairs of coders. The categories were established a posteriori using an inductive approach and codebooks were produced and applied by the pairs. The final codebook was elaborated following Bernard and Ryan (2010) recommendations and included short and detailed description, inclusion and exclusion criteria, typical and atypical quotes and a "close but no" quotation. Inter-rater reliability was analyzed by agreement between pairs with Kappa coefficient (considered good when  $\geq 0.6$ ) calculated with GraphPad QuickCalcs (QuickCalcs. 2017 GraphPad Software Inc. La Jolla, CA, USA). A fifth coder (the main researcher) defined consensuses and helped to maintain the rigor during all steps of the analysis. Final categories and Kappa values were: *teamwork* (0.739); *teacher's role* (0.809); *individual preparation* (0.853); *knowledge acquisition* (0.731); *critical judgment* (0.952); *communication/argumentation* (0.693); *engagement/motivation* (0.759); and *preference for the method* (0.701).

The project was approved by the Ethics Committee for Research with Human Beings of the School of Public Health/ University of São Paulo (FSP/USP). All participants signed informed consent forms.

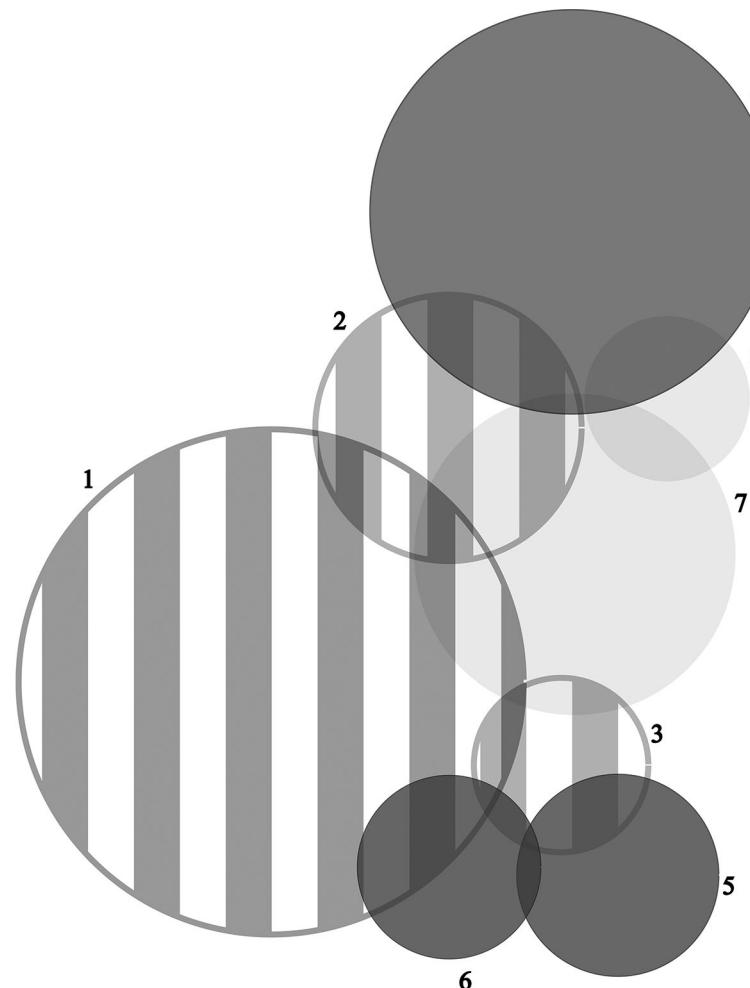
### Results/Analysis

TBL was applied in two classes with 38 and 36 individuals, composed mainly by female students (34 and 32, respectively). Each class was divided into two groups for FG interviews with students that agreed to participate. Thus, the interview were conducted with two FG of 13 and 17 students (78.9% of 38 students) plus 2 groups of 11 and 12 students (63.9% of 36 students). Table 1 presents the categories grouped into three axes according to their meanings in the context studied.

*Teamwork* was the most frequent category (51 occurrences), followed by *knowledge acquisition* (44) and *engagement/motivation* (35). Figure 1 illustrates the occurrence of all categories that emerged, whether they appeared disconnected and interconnected. The sizes of the circles are proportional to each category's frequency and the magnitude of

**Table 1. Axes, categories and respective inclusion criteria**

Axis	Categories	Inclusion criteria
1) Principles of the method	Teamwork	Its presence was perceived in statements about learning to deal with differences; the effort to make it viable; discussions to reach consensus; commitment to classmates' learning. Its absence, in turn, was perceived in statements about one of the members being overloaded with work; division of tasks for individual work; or decisions made by voting rather than consensus within the team.
	Individual preparation	Perception about organization of the weekly study routine and good performance in tests (iRAT and gRAT); commitment to team discussion; or, on the other hand, explicit indication that there was no individual preparation.
	Teacher's role	Perception of the teacher as a facilitator of learning who establishes a horizontal relationship with learners or just transfers knowledge (inconsistent with the method).
2) Results of the experience	Knowledge acquisition	Perception that the method enabled knowledge acquisition; its steps were essential for learning and there was contextualization of content in professional practice.
	Critical Judgment	Expression that the method encouraged questioning and analysis of situations experienced and the information received.
	Communication/argumentation	Demonstration that the method provided improved communication skills and increased self-confidence to discuss/argue.
3) Meanings of the experience	Engagement and motivation	A feeling of encouragement to performing tasks and participating in every step of the method; arousal of affinity with/interest in the content taught; encouragement to get involved with the course through perception of the teacher's dedication.
	Preference for the method	Explicit preference for TBL over other methods used in the course.



Principles of the method	Results of the experience	Meanings of the experience
1. Teamwork 2. Individual preparation 3. Teacher's role	4. Knowledge acquisition 5. Critical judgment 6. Communication and argumentation	7. Engagement and motivation 8. Preference for the method

**Figure 1. Frequency and intersection of categories**

intersections between them. Axis 1 categories (principles of the method) appeared linked to each other and to at least one Axis 2 category (results of the experience), thus forming three pairs: “teamwork/communication and argumentation”, “teacher's role/critical judgment” and “individual preparation/knowledge acquisition”. As a whole, Axis 1 was linked to engagement and motivation (meanings of the experience), which, in turn, was also linked to the other category belonging to the same axis: preference for the method.

### 1) Principles of the Method

The three categories that emerged in this axis revealed the coherence of TBL's principles with the work developed during the course. In addition, the categories indicated mostly good acceptance and approval of the methodology by the students.

The category **teamwork** was often linked to *communication/argumentation*, followed by *individual preparation* and *engagement/motivation*. There was concern with individual preparation to contribute to teamwork during the discussion of the questions in classroom. This form of work was said to inhibit mere division of tasks and encouraged their shared and committed execution, since the pairs, as expressed in statements, would not tolerate lack of commitment. On the other

hand, some teams had problems with lack of commitment by one or more members, which hampered discussions and overloaded their colleagues with work. An example of statement on *teamwork* category was:

“I felt that these group discussions acted like there was integration of the team’s members’ thoughts, like a clear view focusing [...] on the patient... on the population or the target of that policy, but in a way, like a conversation between professionals, you know?”

**Individual preparation** was more often associated with *engagement/motivation*, followed by *knowledge acquisition* and *teamwork*, and perceived mostly as a positive aspect of the course. Such relationship was noticed when students’ statements indicated that this principle led them to create their own study routines, showing responsibility, which, in turn, was related to concern with their performance in tests and their commitment to the team. The following statement exemplifies the *Individual preparation*:

“TBL made no sense if you hadn’t’ read the synthesis, you wouldn’t have anything to discuss with the group, you wouldn’t be able to answer the questions. So, if you hadn’t read it, at least read it, it made no sense, the method was meaningless. So I think the main point of learning was reading”.

Another aspect facilitating individual preparation was the characteristics of the texts provided: they were short, objective, theoretically well-grounded and didactic. Individual preparation, when absent, was said to hamper teamwork and was described as “*lack of responsibility*”.

**Teacher’s role** was associated with critical judgment. Students identified the teacher as the mediator of the learning process, who encouraged knowledge construction and autonomous search for information, as observed in the statement:

“I think she is a mediator. She won’t show that she’s got all the knowledge. She provided us with knowledge, showed us where it is, where we can find it. She gave us some bibliography and everything, but in the end, we had to look for it, we went after it”.

The horizontal relationship between educator and learners was evidenced by the perception of a learning environment open to questions, exchange of knowledge between learner and educator, participation, and encouragement to use critical judgment. On the other hand, the teacher’s role was perceived differently at the feedback step, similar to lectures typical in more traditional/conventional methodologies.

## 2) Results of the experience

In this axis, categories emerged linked to the previous ones, all suggesting that the course allowed better knowledge acquisition and developed communication/argumentation and critical judgment skills.

The category **knowledge acquisition** varied from understanding the content itself from a cognitive perspective to perception of the development of skills needed to apply that content in professional practice. It was mainly related to *individual preparation* seen as the *trigger* for learning. The use of a simulated scenario seemed to hold potential for contributing both to knowledge acquisition and its future application in real-life professional situations, as highlighted on the student’s statement:

“I think it showed how we do public policy in practice; it’s the actual policy there, with the manager, not just on paper... It’s policy in the relationship, in the way of talking and in what to do and how to do it. So, I think it was public policy really experienced, not just on paper”.

Three elements were perceived as necessary for developing **communication/argumentation**: 1) an environment open to discussion, favoring communication, provided mainly by teamwork and the horizontal relationship established by the teacher; 2) a theoretical knowledge basis for arguing, having studied the material provided; and 3) knowing how to articulate and present the arguments - skills related to the environment and the theoretical knowledge basis. A representative example of student’s statement on *communication/argumentation* category was:

“I think the interesting part was that you had to justify and argue for your answer, then you could not just answer and say: ‘Ah, I answered A, can’t it be A?’. No, people answered different things and each one defended their point of view and people said: ‘Oh, I guess yours is not right because of this and that’, and you can debate... I think in our group, at least, the whole thing was better than I expected”.

Development of *critical judgment* was linked to greater opening to questioning and debate with the teacher (horizontal relationship). This relationship encouraged a questioning and challenging attitude and the search for answers (information), as highlighted in the following statement:

“I think it was an interesting exercise and I’m grateful to her for this possibility, and I repeat, it’s a shame that it happened only in the last semester [of Nutrition School], right? It would’ve been good if it had happened before... And maybe it would encourage this kind of feeling in students, of really seeking answers... And not conforming, that’s very important in life. We disagree with things, and even more in the current situation.”

The appeal was considered the TBL step that most aroused critical judgment by allowing students to improve their argumentation skills. In addition, *critical judgment* was also associated with *individual preparation*, which strengthened their arguments and elicited reflections on public policies, nutritionists’ role in the area, and the population’s rights.

### 3) Meanings of the Experience

This axis was related to both principles of the method and results of the experience. Factors that contributed to *engagement and motivation* included the need for continuous study, shown in student’s statement on both *individual preparation* and the tests; commitment to *teamwork*; and *teacher’s role* - where workload and the dedication necessary to use TBL were mentioned as well as the horizontal relationship established with the students throughout the course. The following student’s statement shows the perception of motivation throughout the course:

“Actually, when I saw the name of the course early in the semester I said ‘wow, this course will really make me sleep’. I had huge prejudice in the beginning. [...] To meet other people, to work with them, it was a great challenge, it was really cool, [...] You felt motivated and you’d say: ‘Gosh, I want to know everything so I can answer it right, I want to do well in this’, and it was really cool and I was very open to this course. It instigated us to want to know more about it and how important our role in that area is”.

*Preference for TBL* over conventional methods, in turn, was related to the perception that they were able to learn - to acquire knowledge - better, information, expressed in the student’s statement:

“If it had been taught in a traditional format, like slides or passing a test, it would’ve gone unnoticed, but the way it was, at least for me, even if it’s not something I particularly like [the PPF&N area], I enjoyed the course. I’m more open to it today than I was at the beginning”.

Dynamism of the method was pointed out as determinant for *engagement/motivation* and *preference for TBL*.

### Discussion

The course was designed using a TBL approach to foster knowledge acquisition in PPF&N and development of teamwork skills, making students active in the learning construction process, with greater critical awareness about context and reality. Teaching public policies involves an intrinsic commitment to train professionals who are able to deal with multifactor situations/problems that require multidisciplinary/interdisciplinary and often intersectoral work (Frenk *et al*, 2010; Recine *et al*, 2013)

The TBL method seeks to fill this gap in health professionals training, being a powerful methodology to develop teamwork, communication, problem-solving and conflict mediation skills for students who experience it. These potentialities justify the method’s choice to restructure the course’s methodology. Studies evaluating the effect of TBL on the development of these competencies and skills in health higher education have also shown positive results (Reimschisel *et al*, 2017; Frame *et al*, 2015; Huggins and Stamati, 2015; Bleske *et al*, 2016; Zeng *et al*, 2017; Remington *et al*, 2017)

The use of teamwork as a learning tool is seen as reinforcing possibilities for participation and interaction among students (Reimschisel, 2017). This relationship makes sense if we note that teamwork was perceived when participation in discussions was uniform, with good synchrony and adaptations to differences in ways of thinking and working, always under a respectful relationship.

In this context, the time for discussions is an opportunity to exercise and improve communication skills (Remington *et al*, 2017). TBL is known to be effective in enabling health professionals to work collaboratively while exercising their communication skills with improved decision-making, negotiation, and respect for colleagues (Reimschisel, 2017; Hryncak and Batty, 2012; Currey, 2015).

Relations perceived between teamwork and the categories individual preparation and engagement/motivation, as well as communication/argumentation, can be explained by dynamics inherent to the method. As learners act in teams, they tend to study before classes, making discussions more dynamic and increasing their confidence to argue among themselves and with the teacher. This dynamic seems to favor friendly coexistence with colleagues and the teacher, making the environment more pleasant and motivating.

On the other hand, in this study, the absence of teamwork was noticed when at least one group member did not commit to the activities, hampering discussions and overloading colleagues with tasks. According to [Frame et al. \(2015\)](#), students often resist implementation of TBL or any other active method because they have to change the passive attitude common to the lecture-format classes. In addition, the authors see conflicts as inevitable when working in groups, which may impact students' perceptions about TBL.

Regarding individual preparation, [Remington et al. \(2017\)](#) pointed out that this principle also contributed strongly to learning, similarly to the findings of this study. Evidence indicates that students tend to study 2-3 times longer under TBL when compared to traditional methods ([Zeng et al, 2017](#)). Perception of individual preparation as a crucial stage for learning, noted in this research, seemed to be related to the characteristics of the texts provided, which facilitated reading and organization of the study routine. In turn, [Zeng et al. \(2017\)](#), pointed at the tests as the core factor for students' commitment to self-learning.

It is important to emphasize that TBL requires that both learners and educators fulfill its steps and that the latter change their relationship with the students ([Gullo, Ha and Cook, 2015](#)). In this context, the teacher was recognized as mediator of the autonomous learning process, encouraging knowledge construction and critical judgment. Studies have shown that the tests and tasks performed in TBL allow exercising critical thinking by putting the knowledge acquired into practice in a complex scenario ([Frame et al, 2015](#); [Huggins and Stamatel, 2015](#); [Bleske et al, 2016](#); [Gullo, Ha and Cook, 2015](#)). Critical thinking is also achieved through discussions with teammates, favoring joint learning ([Gullo, Ha and Cook, 2015](#)). In this study, the horizontal relationship established between teacher and students triggered critical thinking already encouraged by the TBL method.

However, the moment when the teacher takes center stage - the feedback step - was perceived as a lecture-format class by students. This contrast to TBL's methodological characteristics seems to have contributed for students to underestimate the importance of that step for learning.

The "meanings of experience" axis bears elements of others ("principles of the method" and "results of the experience"), pointing to students' sense of engagement/motivation and preference for the method. [Haïdet et al \(2012\)](#), created a conceptual model where engagement is the core element, defining it as students' involvement with content and teamwork. In that model, teachers' decisions are used as mediators for students' engagement, which in turn will determine academic success in acquiring knowledge and developing teamwork, communication and leadership skills. The results found in this study are in line with that perspective, since they suggest that the principles of the method were the main factors to determine engagement/motivation toward classes. In this study, the teacher's dedication - perceived in relation to the workload demanded by the method - and the horizontal relationship established with students worked as motivational determinants.

Students' preference for the teaching method is recognized as an important element to motivate learning ([Mangold, 2007](#)). In this study, it was attributed to higher knowledge acquisition. Several statements by students indicate that TBL could be used in other Nutrition School courses as a teaching strategy appropriate for professional practice.

The systematic review conducted by [Reimschisel et al. \(2017\)](#) revealed lack of studies on the impact of TBL in the Nutrition field in developing countries. It included 118 TBL studies in undergraduate Health Schools, most of them related to Medicine and Pharmacy, and none in Nutrition Schools. However, it is well known that nutritionists must be prepared beyond the "assistencialism" perspective, learning to work in teams and perform leadership and management functions under an interprofessional perspective, given the challenges posed by today's global epidemiological scenario ([Recine et al, 2013](#)). Therefore, a strength of this study lies in its originality and pertinence when applying and evaluating the use of TBL in a course of an undergraduate Nutrition School.

Limitations described in studies using TBL include low number of sessions (five on average) and evaluation of the method exclusively through questionnaires that generate scores ([Reimschisel et al, 2017](#)). This study investigated a course taught almost entirely through TBL sessions, employing a qualitative approach that considers students' subjective perceptions.

However, voluntary participation in FGs might have caused bias as a result of inclusion of students who were more engaged with and motivated by the method, amplifying positive perceptions. Another possible limitation of this study was random division of teams. The literature indicates that TBL participants should be chosen to enable a diverse and balanced team composition (Parmelee and Michaelsen, 2010; Parmelee *et al.* 2012). While randomization was employed, chance errors might have happened, which would leave students with similar characteristics on the same team. Although this study's findings cannot be generalized to all undergraduate students and institutions, they represent the perceptions of undergraduate Nutrition students of a public university. Thus, we suggest other researchers, mainly those who study and teach Food and Nutrition policies, to gather knowledge regarding the efficacy of TBL in health professions education and its predictors.

### Conclusion

According to students' perceptions, the three basic TBL principles - *teamwork*, *individual preparation for classes*, and the *teacher's role* as a facilitator of learning - were recognized in the PPF&N course. They reported increased *knowledge acquisition*, improved *communication/argumentation* skills, and development of *critical judgment*. Both the enhancement of these skills and TBL principles contributed to higher *engagement/motivation* toward the course and *preference* for that learning method. Therefore, the results of this study suggest that the use of TBL in Nutrition instruction can contribute to train nutritionists with better technical knowledge, critical judgment, and communication skills.

### Take Home Messages

- TBL has been widely used in health education, but no studies were found addressing higher education in Nutrition.
- TBL was considered effective for enhancing knowledge, communication/argumentation and critical judgment skills.
- TBL was considered suitable for the learning process and for developing important professional skills.
- Individual preparation for classes seems to have placed students in some sort of cycle: reading the texts increased their knowledge, which in turn triggered motivation to study more.
- Engagement/motivation toward the course and preference for TBL were associated with its principles and with the development of the skills mentioned.

### Notes On Contributors

PCJ is an Associate Professor at The School of Public Health/University of São Paulo (USP) and a Researcher at the Center for Epidemiological Research in Nutrition and Health (NUPENS/USP).

CRT is a PHD student on the Nutrition in Public Health Graduate Program at the School of Public Health/USP.

KTG is a master's degree student on the Nutrition in Public Health Graduate Program at the School of Public Health/USP.

LCR is a PHD student on the Nutrition in Public Health Graduate Program at the School of Public Health/USP.

TMM is a PHD student on the Nutrition in Public Health Graduate Program at the School of Public Health/USP.

### Declarations

The author has declared that there are no conflicts of interest.

### Ethics Statement

The project was approved by the Ethics Committee for Research with Human Beings of the School of Public Health/University of São Paulo (FSP/USP) - 1.814.978. All participants signed informed consent forms.

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## Bibliography/References

Alves, C.G.L., Martinez, M.R. (2016) **Lacunas entre a formação do nutricionista e o perfil de competências para atuação no Sistema Único de Saúde (SUS)**. *Interface (Botucatu)*. 20(56), pp. 159-169.  
**Reference Source**

Bleske, B.E., Remington, T.L., Wells, T.D., Klein, K.C., et al. (2016) **A Randomized Crossover Comparison of Team-based Learning and Lecture Format on Learning Outcomes**. 80(7).  
**Reference Source**

Currey, J., Oldland, E., Considine, J., et al. (2017) **Evaluation of postgraduate critical care nursing students' attitudes to, and engagement with, Team-Based Learning: A descriptive study**. *Intensive and Critical Care Nursing*. 31(1), pp. 19-28.  
**Reference Source**

Fanzo, J.C., Graziote, M.M., Kraemer, K., Gillespie, S., et al. (2015) **Educating and Training a Workforce for Nutrition in a Post-2015 World**. *Advances in Nutrition*. 6(6), pp. 639-647.  
**Reference Source**

Food and Agriculture Organization of the United Nations (FAO) and World Health Organization (WHO) (2016) *United Nations Decade of Action on Nutrition 2016-2025: towards country-specific smart commitments for action on nutrition*. Available at:  
**Reference Source** (Accessed: 24 August 2018)

Frame, T.R., Cailor, S.M., Gryka, R.J., Chen, A.M., et al. (2015) **Student Perceptions of Team-based Learning vs Traditional Lecture-based Learning**. *American Journal of Pharmaceutical Education*. 79(4).  
**Reference Source**

Frenk, J., Chen, L., Bhutta, Z.A., Cohen, J., et al. (2010) **Health professionals for a new century: transforming education to strengthen health systems in an interdependent world**. *The Lancet*. 376(9756), pp. 1923-1958.  
**Reference Source**

Gullo, C., Ha, T.C., Cook, S. (2015) **Twelve tips for facilitating team-based learning**. *Medical Teacher*. 37(9), pp. 819-824.  
**Reference Source**

Haidet, P., Levine, R. E., Parmelee, D. X., Crow, S., et al. (2012) **Guidelines for Reporting Team-Based Learning Activities in the Medical and Health Sciences Education Literature**. *Academic Medicine*. 87(3), pp. 292-299.  
**Reference Source**

Hryncak, P., Batty, H. (2012) **The educational theory basis of team-based learning**. *Medical Teacher*. 34(10), pp. 796-801.  
**Reference Source**

Huggins, C.M., Stamatel, J.P. (2015) **An exploratory study comparing the effectiveness of lecturing versus team-based learning**. *Teaching Sociology*. 43(3), pp. 227-235.  
**Reference Source**

Mangold, K. (2007) **Educating a new generation: teaching baby boomer faculty about millennial students**. *Nurse Educator*. 32(1), pp. 21-23.  
**Reference Source**

Parmelee, D.X., Michaelsen, L.K. (2010) **Twelve tips for doing effective Team-Based Learning (TBL)**. *Medical Teacher*. 32(2), pp. 118-122.  
**Reference Source**

Parmelee, D.X., Michaelsen, L.K., Cook, S., Hudes, P.D. (2012) **Team-based learning: A practical guide: AMEE Guide No. 65**. *Medical Teacher*. 34(5).  
**Reference Source**

Recine, E., Mortoza, A.S. (2013) *Consenso sobre Habilidades e Competências do Nutricionista no Âmbito da saúde Coletiva*. Brasília (DF): Observatório de Políticas de Segurança Alimentar e Nutrição.

Reimschisel, T., Herrin, g A. L., Huang, J., Minor, T. J., (2017) **A systematic review of the published literature on team-based learning in health professions education**. *Medical Teacher*. 39(12), pp. 1227-1237.  
**Reference Source**

Remington, T.L., Bleske, B.E., Bartholomew, T., Dorsch, M.P. (2017) **Qualitative Analysis of Student Perceptions Comparing Team-based Learning and Traditional Lecture in a Pharmacotherapeutics Course**. *American Journal of Pharmaceutical Education*. 81(3).

Ryan, G.H., Bernard, H.R. (2010). **Content Analysis**. In: Bernard, H.R., Ryan, G.H. *Analyzing qualitative data: Systematic approaches*. 2nd edn. Thousand Oaks, California: Sage, pp. 287-310.

University of British Columbia (UBC). Vancouver Campus. Faculty of Applied Science Centre for Instructional Support. (n.d.) Team-based Learning' Available at:  
**Reference Source** (Accessed: 22 December 2017).

Zeng, R., Xiang, L., Zeng, J., et al. (2017) **Applying team-based learning diagnostics for undergraduate students: assessing teaching effectiveness by a randomized controlled trial study**. *Advances in Medical Education and Practice*. 8, pp. 211-218.  
**Reference Source**

# Open Peer Review

## Migrated Content

### Version 2

Reviewer Report 04 August 2019

<https://doi.org/10.21956/mep.20233.r31351>

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### Tharin Phenwan

University of Dundee

This review has been migrated. The reviewer awarded 3 stars out of 5

First of all, I must commend the authors to improve their work and it is even better than the first version. The article is much better and easier to navigate through. Overall, this is a good article that will be of interest to those who are involved in teaching and curriculum planning.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 29 July 2019

<https://doi.org/10.21956/mep.20233.r31354>

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### Augusto Scalabrini Neto

University of Sao Paulo School of Medicine

This review has been migrated. The reviewer awarded 2 stars out of 5

This is mostly a reaction study to TBL using Nutrition students. The method has been widely discussed in other studies, and it does not seem that a new knowledge emerged from this description.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 27 July 2019

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**sathyaranarayanan varadarajan**

SRM Medical College, SRM University

This review has been migrated. The reviewer awarded 4 stars out of 5

This is a good article based on the qualitative descriptive study which has analyzed perceptions of Undergraduate Nutrition students on the use of Team Based Learning (TBL) in the course Public Policies on Food and Nutrition (PPF&N). In order to understand students' perception of the experience, focal groups (FG) were used for data collection. The results of this study suggest that the use of TBL in Nutrition instruction can contribute to train nutritionists with better technical knowledge, critical judgment, and communication skills. Though this study has some limitations, it has contributed well to the field of higher education in Nutrition where no studies were found addressing this issue. It will be helpful to medical educators who are involved in curriculum planning and development for higher education in Nutrition to consider TBL as an effective educational strategy for enhancing knowledge, communication/argumentation and critical judgment skills.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 16 July 2019

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**Ken Masters**

Sultan Qaboos University

This review has been migrated. The reviewer awarded 4 stars out of 5

This is a revised version of the previously-submitted paper. I am pleased to see that the authors have used the opportunity to address the issues raised by the reviewers of the original paper. One area, however, that could still have had more information as requested, was on the running of the focus groups. Although a little more information has been given about the these, not all the requested

information has been supplied. In particular, the length of time that the focus groups were run, the numbers and types of questions given to the participants, etc. (Although the script structure is given, more details would have helped – compare this to a quantitative survey, in which supplying a copy of the survey form is relatively standard.). Nevertheless, a useful improvement.

**Competing Interests:** No conflicts of interest were disclosed.

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### Version 1

Reviewer Report 11 October 2018

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#### **Tharin Phenwan**

<sup>1</sup> University of Dundee

<sup>2</sup> University of Dundee

This review has been migrated. The reviewer awarded 3 stars out of 5

An interesting paper to assess the undergraduate students' perception regarding TBL. Good details on the course and rationale to conduct the research with supporting reference. -The authors described the participants to some degree and the overall usage of the focus group and content analysis but do not give deeper details of how they collected and analysed the data. Rigour was also not mentioned; how do they increase the rigour of this work? How many researchers analyse the data and how did they deal with discrepancies? How did they develop the codebook? - They did not explain the context clearly. How does the curriculum look like? How many students were there? Were they all recruited? - Some remark on the ethical aspect of this classroom research. Will the students feel coerced to join as participants since they were obliged to join this course as parts of their learning? And how did the authors deal with this situation? -On the methodology section, how long did the interviews last? How did the authors create the codebook? Were there any field notes or audit trails during the process? Participant demographical data was also not mentioned. -Results section could be improved. I believe that the readers still cannot picture the participants. What are they like? Is it one gender-dominated? What about their grades? Were there any specific differences or similarity between the groups? -Table 1 is comprehensive, but the inclusion column could be easier to navigate. This also applies to table 2. The examples column is rather hard to follow through. It may be easier to read if the authors selectively pick up the most meaningful quotes. - Figure 1 captures the good summary of the texts, making it easier to follow. There is also a minor correction to change the word "figure 2" to "figure 1" in the main text. -Implications for future works were

not clearly mentioned. How will you continue to monitor these participants. And how will you assess them more objectively in the future? Overall a good article that will be an interest of those who are involved in teaching and curriculum planning.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 08 October 2018

<https://doi.org/10.21956/mep.19116.r27579>

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### Ramon Esperon-Hernandez

<sup>1</sup> University of Yucatan

<sup>2</sup> University of Yucatan

This review has been migrated. The reviewer awarded 3 stars out of 5

The idea of the article is good and contributes the experience gained in the implementation of the Team Based Learning (TBL) like pedagogical strategy in the course Public Policies on Food and Nutrition. The methodology is not clear regarding the data collection and qualitative analysis, I suggest to describe it better. The organization of the focus groups is confusing; it is difficult to understand that there were four focus groups of 11-17 subjects. It is assumed that being four focus groups required two pairs of coders, a total of four. It does not specify if you used any software for qualitative analysis. Figure 1 is referred to in the text as figure 2. It is very illustrative, I suggest mentioning the name of the representation technique used to elaborate figure 1. I suggest inserting labels to each circle with the name of the category; it is difficult to make an analysis with the numbers. About the conclusions, although the TBL strategy has been accepted in the literature as valuable, and the perceptions of the students are good, I consider that the design of the study does not allow affirming the increase or improvement of the skills, because don't were compared before and after the course.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 06 October 2018

<https://doi.org/10.21956/mep.19116.r27578>

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**Ken Masters**<sup>1</sup> Sultan Qaboos University<sup>2</sup> Sultan Qaboos University

This review has been migrated. The reviewer awarded 3 stars out of 5

Overall, a useful study. A little more detail replied, and some small changes in the presentation of the data would be appreciated. I would like to see a more information about the numbers of students. The number of students on the course does not appear to be given. With the focus groups, I see only that "each class was divided into two groups (11-17 students) for the FG conducted by an experienced mediator in the presence of an observer." This would tell me that each class was between 22 and 34 students, but that is very vague. So, I would like to see specifics of the class size and of each focus group (and I'm assuming there were only two focus groups, but the paper speaks of the FG in the singular). I would also like to see a little more description about the FG process followed. (Time, number and types of questions, etc.). "approach and codebooks were produced" – Are these codebooks books of codes? This needs a little more explanation. I can understand the logic of combining the examples into Table 2, but, from a reader's perspective, it would be better if the examples could be given in their respective section. This is in keeping with what readers expect, and is easier to understand, so that readers do not have to return to the previous section to try to match examples to content. A few more examples would also be nice – you have the space, so please use it. (If you don't wish to break the flow of the paper, then please supply them in supplementary files). I would also like to see some discussion about how generalisable the authors believe these results to be.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 06 October 2018

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**Barbara Jennings**<sup>1</sup> Norwich Medical School<sup>2</sup> Norwich Medical School

This review has been migrated. The reviewer awarded 4 stars out of 5

This article by Patricia Constante Jaime et al about TBL resonated with me because of my roles as a tutor for problem based learning (PBL), and curriculum planner. I enjoyed reading the paper and thinking about the various approaches that are possible in small group settings, using a constructivist approach. I

will share the article with colleagues, along with some key papers cited by the authors that explore the theoretical framework and effectiveness of TBL. This paper is well-written, with strengths in the literature review; the design of the associated study; and in its description of the evidence-based TBL intervention (which reads like an interesting case report in itself) in the School of Public Health at the University of Sao Paolo. The content analysis was clearly described and justified and the results were clearly presented and discussed. Figure 1 is a really informative graphic which gives an immediate overview of the weighting and intersection of the range of student's perceptions. The role of the "teacher" is (quite rightly) not perceived to be a major issue by the students. The educators' collective responsibilities are to develop the right learning environment and educational materials to promote stepwise active-learning and teamwork, so much of it this is behind the scenes and light-touch facilitation. The authors discuss the transition that occurs when the horizontal student-teacher relationship morphs into a more didactic lecturer-student interaction for the feedback step. Although the acceptability and effectiveness of TBL are well-established in the literature, the novelty of this study is in its application to a nutrition and public policy setting.

**Competing Interests:** No conflicts of interest were disclosed.

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